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MATH 361 HW 2.6

✓ ✓ ✓ ✓
1a, 1b, 1c, 2a

Problem 1

a.) $f(x) = x^3 - 2x^2 - 5$, $P_0 = 2.5$

2.5	1	-2	0	-5
		2.5	1.25	3.125
	1	0.5	3.125	-1.875 = $f(2.5)$

2.5	1	0.5	3.125
		2.5	7.5
	1	3.0	10.625 = $f'(2.5)$

$$x_1 = 2.5 + \frac{-1.875}{10.625} = 2.323529412$$

2.323	1	-2	0	-5
		2.323	0.780	1.742
	1	0.323	0.780	-3.258 = $f(2.323)$

2.323	1	0.323	0.750
		2.323	6.147
	1	2.646	4.610 = $f'(2.323)$

$$x_2 = 2.323 + \frac{(-3.258)}{(4.610)} = 1.616 \longrightarrow ?$$

b.) $f(x) = x^3 + 3x^2 - 1$, $P_0 = -1$

-1	1	3	0	-1
		-1	-2	2
	1	2	-2	1
		-1	-1	
	1	1	-3	

$$x_1 = -1 - \frac{1}{-3} = \frac{-3}{3} + \frac{1}{3} = \frac{-2}{3}$$

$-2/3$	1	3	0	-1
		$-2/3$	$-14/9$	$28/27$
	1	$7/3$	$-14/9$	$1/27$
		$-2/3$	$-10/9$	
	1	$5/3$	$-24/9 = -8/3$	

$$x_2 = -\frac{2}{3} - \frac{1/27}{-72/27} = -\frac{2}{3} + \frac{1}{72} = \frac{-48}{72} + \frac{1}{72} = \frac{-47}{72}$$

$\frac{-47}{72}$	1	3	0	-1
		$\frac{-47}{72}$	$\frac{-7943}{5184}$	$373521/373248$
	1	$\frac{169}{72}$	$\frac{-7943}{5184}$	$75/373248$
		$\frac{-47}{72}$	$\frac{-2867}{2592}$	
	1	$\frac{61}{36}$	$\frac{-4559}{1728}$	

$$x_3 = -\frac{47}{72} - \frac{73/373248}{-4559/1728} = -0.6827036468$$

$x_3 = -0.6827036468$

Problem 1 continued

c.) $f(x) = x^3 - x - 1$, $p_0 = 1.25$

1.25	1	0	-1	-1
		1.25	1.5625	0.703125
	1	1.25	0.5625	-0.296875
		1.25	3.125	
	1	2.50	3.6875	

$$x_1 = 1.25 - \frac{-0.296875}{3.6875} = 1.330508475$$

1.330508475	1	0	-1	-1
		1.330508475	1.770252801	1.024827879
	1	1.330508475	0.770252801	0.024827879
		1.330508475	3.540505604	
	1	2.661016950	4.310758405	

$$x_2 = 1.330508475 - \frac{0.024827879}{4.310758405} = 1.324874228$$

$$x_2 = 1.324874228$$

Problem 2

a.) $f(x) = x^4 + 5x^3 - 9x^2 - 85x - 136$: $g(x) = x - \dfrac{x^4 + 5x^3 - 9x^2 - 85x - 136}{4x^3 + 15x^2 - 18x - 85}$

$x = -4.123105626$

-4.123105626	1	5	-9	-85	-136
		-4.123105626	-3.615528128	52.015155	136
	1	0.8768948744	-12.61552813	-32.984845	0
		-4.123105626	13.38447187	-3.170436268	
	1	-3.246811281	0.7689437418	-36.15528127	

$Q_1(x) = x^3 + 0.8768948744x^2 - 12.61552813x - 32.984845$

$Q(x) = x^2 + 5x - 9$

$$f(x) = (x - 4.123105626)(x + 4.123105626)(x^2 + 5x - 9)$$

$f(x) = (x + 4.123105626)(x^3 + 0.8768948744x^2 - 12.61552813x - 32.984845)$

($Q_1(x)$)

guess	1	0.87	12.6	-32.9
		~	~	~
	1	~	~	

$Q_2(x) = ax^2 + bx + c$

⇒ quad formula